

**Enhanced Undersea Weapons Hardware-in-the-Loop Laboratory  
(EUWHILL)**

**Final Report for Contract N00014-12-1-1039**

**Prepared by:**

**Eric H. Wagner**

**Engineering Project Manager**

**Penn State's Applied Research Laboratory**

<b>REPORT DOCUMENTATION PAGE</b>				<b>Form Approved OMB No. 0704-0188</b>		
<small>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.</small>						
<b>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</b>						
<b>1. REPORT DATE</b> (DD-MM-YYYY)		<b>2. REPORT TYPE</b> Final		<b>3. DATES COVERED</b> (From - To) 16-Jul-2012 through 31-Dec-2013		
<b>4. TITLE AND SUBTITLE</b> Enhanced Undersea Weapons Hardware-in-the-Loop Laboratory (EUWHILL)				<b>5a. CONTRACT NUMBER</b>		
				<b>5b. GRANT NUMBER</b> N00014-12-1-1039		
				<b>5c. PROGRAM ELEMENT NUMBER</b>		
<b>6. AUTHOR(S)</b> Gary Neal				<b>5d. PROJECT NUMBER</b> 16992		
				<b>5e. TASK NUMBER</b>		
				<b>5f. WORK UNIT NUMBER</b>		
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> The Pennsylvania State University Applied Research Labotatory Office of Sponsored Programs 110 Technology Center Building University Park, PA 16802-7000				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>		
<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> Office of Naval Research 875 North Randolph Street Arlington, VA 22203-1995				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b> ONR 333		
				<b>11. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>		
<b>12. DISTRIBUTION AVAILABILITY STATEMENT</b> "Approved for Public Release; distribution is Unlimited".						
<b>13. SUPPLEMENTARY NOTES</b>						
<b>14. ABSTRACT</b> The equipment requested expanded the Enhanced Undersea Weapons Hardware-in-the-Loop Laboratory (EUWHILL) system which is being used by students, scientists, and engineers at ARL/PSU. The equipment has been instrumental in providing an environment to become knowledgeable on the science and technologies required in the development of advanced weapons and helps to support technology development and transition for current and future programs sponsored by organizations such as the Office of Naval Research (ONR), DARPA, and The Naval Sea Systems Command (NAVSEA). The equipment purchased helps support increased demand for laboratory testing of vehicle hardware, reduced costly in-water field testing, and increased the speed of technology development.						
<b>15. SUBJECT TERMS</b>						
<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b> Unclassified	<b>18. NUMBER OF PAGES</b>	<b>19a. NAME OF RESPONSIBLE PERSON</b>	
a. REPORT u	b. ABSTRACT u	c. THIS PAGE u			<b>19b. TELEPHONE NUMBER (Include area code)</b>	

## 1. Summary

The equipment requested expanded the Enhanced Undersea Weapons Hardware-in-the-Loop Laboratory (EUWHILL) system which is being used by students, scientists, and engineers at ARL/PSU. The equipment has been instrumental in providing an environment to become knowledgeable on the science and technologies required in the development of advanced weapons and helps to support technology development and transition for current and future programs sponsored by organizations such as the Office of Naval Research (ONR), DARPA, and The Naval Sea Systems Command (NAVSEA). The equipment purchased helps support increased demand for laboratory testing of vehicle hardware, reduced costly in-water field testing, and increased the speed of technology development.

## 2. Instrumentation

The following information provides instrumentation part numbers and total cost.

<u>Item#</u>	<u>Description</u>	<u>Exp Cost</u>
1	PN: TDS2024C; Tektronics Oscilloscope, 200 MHz	\$ 8,386.25
2	PN: P5100A; Tektronics High Voltage Probe	\$ 341.34
3	PN: 190-202/AM; Fluke Scopemeter 2 Channel 200 MHz	\$ 2,767.50
4	PN 781058-01; NI PXIe-6368 X Series Multifunction DAQ	\$ 28,796.00
5	PN 192061-02; SHC68-68-EPM Shielded Cable	\$ 1,112.00
6	PN 781482-01; PXI-103x and PXIe-107x Side Handle and Rubber Feet	\$ 120.00
7	PN 781161-01; NI PXIe-1073 Integrated MXIe	\$ 2,798.00
8	Freight Charges for PO 930346PN 781058-01; NI PXIe-6368 X Series Multifunction DAQ	\$ 121.73
9	PN 780683-02; NI PCI-8512/2, CAN Interface, High Speed, 2 Port	\$ 3,090.00
10	PO 930760 FREIGHT CHARGESPN 780683-02; NI PCI-8512/2, CAN Interface, High Speed, 2 Port	\$ 18.79
11	AV-900 Power System Package	\$275,000.00
12	Dell Precision T5600E (2)	\$ 4,785.60
13	Belkin F1DC101HS Single rail rackmount	\$ 707.98
14	110' of MTQ-350-01 Single conductor cab	\$ 1,320.00
15	MSC Direct- T-Slot bolts, nuts and washers	\$ 529.39
16	200 HP AC Dynamometer System to include dynamometer, Torque Flange, Speed Sensor, ABB DTC Motor Drive, Flange to Bolt to Drive Shaft or Coupler, 15 ft Motor Cable, 30 ft Signal Cables, and Calibration Weight with Calibration Arm	\$124,200.00
17	Mustang Shipping	\$ 1,300.00
18	6'x9'x7' Baseplate (2)	\$ 35,376.00
19	Pelican Hardigg Ruggedized Rack	\$ 3,547.90
20	Triangle Precision - Crossbars	\$ 1,305.00
	Total Equipment Expenditures	\$ 495,623.48
	Funds Received	\$ 495,492.00
	Fund Balance	\$ (131.48)